

WHAT IS CLAIMED IS:

1. A semiconductor integrated circuit device formed on a main surface of a semiconductor substrate, comprising:

a plurality of internal circuits formed on said main surface;

5 a first power supply interconnection for supplying a first external power supply potential externally provided to said semiconductor integrated circuit device to said plurality of internal circuits;

a second power supply interconnection for supplying a second external power supply potential externally provided to said semiconductor integrated circuit device to said plurality of internal circuits;

10 an internal power supply circuit, provided between a prescribed one of said plurality of internal circuits and said second power supply interconnection, for converting a level of said second external power supply potential to supply an internal power supply potential to said prescribed internal circuit;

15 a testing circuit for conducting a self-test of said semiconductor integrated circuit device,

said testing circuit including a measuring circuit for detecting a current amount being supplied from said internal power supply circuit to said prescribed internal circuit; and

20 a data output circuit for outputting said detected result outside said semiconductor integrated circuit device.

2. The semiconductor integrated circuit device according to claim 1, wherein

5 said internal power supply circuit includes a voltage converting unit supplying said internal power supply potential to a power supply node of said prescribed internal circuit in a testing operation with a second current supplying capability that is lower than a first current supplying capability in an operation of said prescribed internal circuit, and

said measuring circuit detects said current amount by detecting a change in potential level of said power supply node in said testing operation.

3. The semiconductor integrated circuit device according to claim 1, wherein

said internal power supply circuit includes

a first voltage converting circuit for supplying said internal power supply potential to a power supply node of said prescribed internal circuit with a first current supplying capability in an operation of said prescribed internal circuit and

a second voltage converting circuit for supplying said internal power supply potential to said power supply node with a second current supplying capability that is smaller than said first current supplying capability in said operation and during standby of said prescribed internal circuit and in a testing operation, and

said measuring circuit detects said current amount by detecting a change in potential level of said power supply node in said testing operation with said first voltage converting circuit being suspended.

4. The semiconductor integrated circuit device according to claim 3, wherein said measuring circuit includes a comparing circuit comparing the potential level of said power supply node with a prescribed reference potential in said testing operation to detect said current amount.

5. The semiconductor integrated circuit device according to claim 4, wherein

said testing circuit further includes a storage circuit for storing the detected result of said measuring circuit in said testing operation, and

said data output circuit outputs said detected result stored in said storage circuit.

6. The semiconductor integrated circuit device according to claim 5, wherein said storage circuit stores data externally output from said internal circuit in a normal operation.

7. The semiconductor integrated circuit device according to claim 4,

wherein

said plurality of internal circuits include a memory circuit for storing data externally supplied to said semiconductor integrated circuit device in a normal operation, said memory circuit storing a detected result of said measuring circuit in a testing operation, and

said data output circuit outputs said detected result stored in said memory circuit.

8. The semiconductor integrated circuit device according to claim 1, wherein

said internal power supply circuit includes a voltage converting circuit for supplying said internal power supply potential to a power supply node of said prescribed internal circuit with a first current supplying capability in an operation of said prescribed internal circuit,

said testing circuit further includes a reference current generating circuit for supplying a power supply current to said power supply node with a second current supplying capability in a testing operation, and

said measuring circuit detects said current amount by detecting a change in potential level of said power supply node in said testing operation with said voltage converting circuit being suspended.

9. The semiconductor integrated circuit device according to claim 8, wherein

said reference current generating circuit includes an input terminal for controlling said power supply current value from said reference current generating circuit from an outside of said semiconductor integrated circuit device, and

a current generating circuit for changing said power supply current value according to a signal applied to said input terminal.

10. The semiconductor integrated circuit device according to claim 9, wherein

said power supply current value is changed in a plurality of stages,

and

5 said measuring circuit detects said current amount by comparing a potential level of said power supply node at each of said power supply current values changed in the stages with a reference potential.

11. The semiconductor integrated circuit device according to claim 10, wherein

 said testing circuit includes

5 first and second holding circuits for respectively holding a comparison result of said measuring circuit with the power supply current value of a preceding stage and a comparison result of said measuring circuit with the power supply current value of a present stage, and

10 a logic circuit detecting a change point of the comparison results based on said comparison results held in said first and second holding circuits.

12. The semiconductor integrated circuit device according to claim 11, wherein said logic circuit includes an exclusive OR circuit performing an exclusive OR operation for the comparison results held in said first and second holding circuits.

13. The semiconductor integrated circuit device according to claim 11, wherein said testing circuit includes a coding circuit coding said power supply current values changed in said plurality of stages.

14. The semiconductor integrated circuit device according to claim 13, wherein

5 said plurality of internal circuits include a memory circuit for storing data externally provided to said semiconductor integrated circuit device in a normal operation, and

 said testing circuit further includes a transmitting circuit for storing said coded power supply current value to said memory circuit according to a detected result of said logic circuit in the testing operation.

15. A semiconductor integrated circuit device formed on a main surface of a semiconductor substrate, comprising:

a plurality of internal circuits formed on said main surface;

a first power supply interconnection for supplying a first external power supply potential externally provided to said semiconductor integrated circuit device to said plurality of internal circuits;

a second power supply interconnection for supplying a second external power supply potential externally provided to said semiconductor integrated circuit device to said plurality of internal circuits;

an internal power supply control circuit provided between a prescribed one of said plurality of internal circuits and said second power supply interconnection for controlling supply of an internal power supply potential to said prescribed internal circuit;

a testing circuit for conducting a self-test of said semiconductor integrated circuit device,

said testing circuit including a measuring circuit for detecting a current amount being provided from said second power supply interconnection to said prescribed internal circuit; and

a data output circuit for outputting said detected result outside said semiconductor integrated circuit device.

16. The semiconductor integrated circuit device according to claim 15, wherein said internal power supply control circuit includes an internal power supply circuit capable of selectively supplying the internal power supply potential obtained by converting a level of said second external power supply potential to a power supply node of said prescribed internal circuit.

17. The semiconductor integrated circuit device according to claim 15, wherein said internal power supply control circuit includes a switch circuit capable of selectively conducting potential supply from said second power supply interconnection to a power supply node of said prescribed internal circuit.

18. The semiconductor integrated circuit device according to claim 15, wherein

said testing circuit includes a reference current generating circuit for supplying a power supply current to said power supply node with a variable current supply amount in a testing operation, and

said measuring circuit detects said current amount by detecting a change in potential level of said power supply node in said testing operation with the potential supply from said internal power supply control circuit to said power supply node being suspended.

19. The semiconductor integrated circuit device according to claim 18, wherein

said reference current generating circuit includes

a reference potential generating circuit for generating a prescribed reference potential,

a variable resistance having an end coupled to a prescribed potential, and

a current source circuit generating said power supply current according to a comparison result of a potential at another end of said variable resistance with said prescribed reference potential.

20. The semiconductor integrated circuit device according to claim 19, wherein

said testing circuit further includes a test control circuit changing said power supply current value in a plurality of stages in said testing operation, and

said measuring circuit detects said current amount by comparing a potential level of said power supply node at each of said power supply current values changed in the stages with a reference potential.

21. The semiconductor integrated circuit device according to claim 20, wherein

said testing circuit includes

5 first and second holding circuits for respectively holding a
comparison result of said measuring circuit with the power supply current
value of a preceding stage and a comparison result of said measuring circuit
with the power supply current value of a present stage, and
a logic circuit detecting a change point of the comparison results
based on said comparison results held in said first and second holding
10 circuits.

22. The semiconductor integrated circuit device according to claim
21, wherein said logic circuit includes an exclusive OR circuit performing an
exclusive OR operation for the comparison results held in said first and
second holding circuits.

23. The semiconductor integrated circuit device according to claim
21, wherein said testing circuit includes a coding circuit coding said power
supply current values changed in said plurality of stages.

24. The semiconductor integrated circuit device according to claim
23, wherein
said plurality of internal circuits include a memory circuit for storing
data externally provided to said semiconductor integrated circuit device in a
normal operation, and
5 said testing circuit further includes a transmitting circuit for storing
said coded power supply current values to said memory circuit according to a
detected result of said logic circuit in the testing operation.

25. A semiconductor integrated circuit device formed on a main
surface of a semiconductor substrate, comprising:
a plurality of internal circuits formed on said main surface;
a first power supply interconnection for supplying a first external
5 power supply potential externally provided to said semiconductor integrated
circuit device to said plurality of internal circuits;
a second power supply interconnection for supplying a second

external power supply potential externally provided to said semiconductor integrated circuit device to said plurality of internal circuits;

10 an internal power supply control circuit provided between a prescribed one of said plurality of internal circuits and said second power supply interconnection for controlling supply of an internal power supply potential to said prescribed internal circuit;

15 a testing circuit for conducting a self-test of said semiconductor integrated circuit device,

 said testing circuit including a measuring circuit for detecting a current amount being supplied from said second power supply interconnection to said prescribed internal circuit; and

20 a shutdown circuit suspending potential supply from said internal power supply control circuit to a power supply node of said prescribed internal circuit according to said detected result.

26. The semiconductor integrated circuit device according to claim 25, wherein said internal power supply control circuit includes an internal power supply circuit that is controlled by said shutdown circuit and is capable of selectively supplying an internal power supply potential obtained by converting a level of said second external power supply potential to a power supply node of said prescribed internal circuit.

27. The semiconductor integrated circuit device according to claim 25, wherein said internal power supply control circuit includes a switch circuit that is controlled by said shutdown circuit and is capable of selectively performing potential supply from said second power supply interconnection to a power supply node of said prescribed internal circuit.

28. A testing circuit for testing a plurality of semiconductor integrated circuit devices in a batch, comprising:

5 a signal interconnection commonly provided for said plurality of semiconductor integrated circuit devices for sending signals to and receiving signals from said plurality of semiconductor integrated circuit devices;

a first power supply interconnection commonly provided for said plurality of semiconductor integrated circuit devices for supplying a first external power supply potential;

10 a second power supply interconnection commonly provided for said plurality of semiconductor integrated circuit devices for supplying a second external power supply potential;

15 a power supply control circuit provided between each said semiconductor integrated circuit device and said second power supply interconnection for controlling the supply of said second power supply potential to said relevant semiconductor integrated circuit device;

20 a testing circuit provided for each said semiconductor integrated circuit device for detecting a current amount being supplied from said second power supply interconnection to said relevant semiconductor integrated circuit device; and

a shutdown circuit provided for each said semiconductor integrated circuit device for suspending potential supply from said power supply control circuit to said relevant semiconductor integrated circuit device according to a detected result of said testing circuit.